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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :

B65H 1/26, 31/32

A1

(11) International Publication Number:

WO 96/3234

(43) International Publication Date:

17 October 1996 (17.10.96)

(21) International Application Number: PCT/DK96/00170

(22) International Filing Date: 10 April 1996 (10.04.96)

(30) Priority Data:

0438/95

11 April 1995 (11.04.95)

DK

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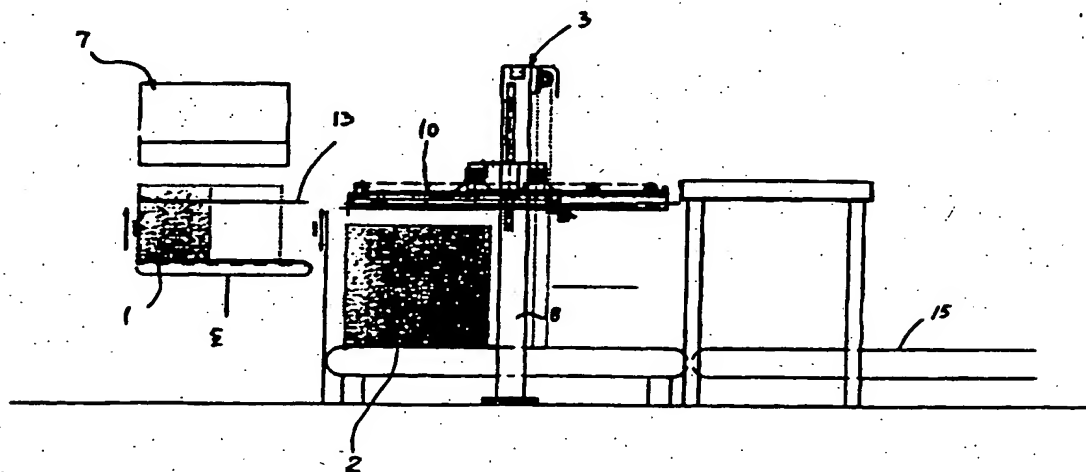
(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ,
BB, BG, BR, BY, CA, CH, CN, CZ, CZ (Utility model),
DE, DE (Utility model), DK, DK (Utility model), EE, E:
(Utility model), ES, FI, FI (Utility model), GB, GE, HU, IS,
JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD,
MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD,
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UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ,
UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ,
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GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF,
BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG)

Published

With international search report.

In English translation (filed in Danish).

(54) Title: METHOD AND APPARATUS FOR DESTACKING AND SUPPLYING SHEET MEMBERS FROM A STACK TO A PROCESSING APPARATUS



(57) Abstract

A method for destacking and supplying sheet members (1) from a stack to a processing apparatus, for instance within the paper and cartilage industry, and where the sheet members (1) are supplied via a feeder part (5) in pre-adjusted stacks on carrying plates (13), where the pre-adjusted stacks (2) of sheet members (1) by the preceding adjustment are placed in a predetermined position on the carrying plate (13), preferably close to the front edge thereof, that the stack (2) in the feeder part (5) of a first lifting device (9) is moved upwardly for successive feeding of uppermost sheet in the stack (2) to the processing apparatus (7), that an extra lifting device (11) takes over and moves a last part of the stack (2) up towards the top of the feeding part, as the stack (2) in a per se known manner is supported temporarily on the extra lifting device (11) by means of a number of carrying bars or spears (19), that a new stack (2) is fed to said first lifting device (9) in the feeding part (5) and is lifted upwards to engagement under said last part of the previous stack (2), and that the extra lifting device (11) is moved downwards, before the carrying bars or spears (19) are retracted, so that the last part of the previous stack (2) being placed directly on the new stack (2) of sheet members (1), etc.

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Method and apparatus for destacking and supplying sheet members from a stack to a processing apparatus

The present invention relates to a method for destacking and supplying sheet members from a stack to a processing apparatus, and of the type described in the introductory part of claim 1.

- 5 For use in the paper and cartilage industry such methods and apparatuses for destacking and supplying sheet members to processing apparatuses are known, and where there is worked with cardboard or paper sheets supplied in pre-adjusted stacks on a usually custom-built pallet of tree. The height of the stack may be large, for instance until 1.5 meter and the thickness of the individual sheets may vary rather much from less than
10 0.1 - 6 mm, that is that the weight of the stack may vary rather much, as a stack consisting of very thin paper sheets has a very heigher weight than that of a stack consisting of rather thick corrugated cardboard.

It means, that shift of stack will take place with shorter intervals, when it concerns a
15 stack with relatively few, thick sheets, than when it concerns a stack with relative many, thin sheets.

The feeding part of known apparatuses comprises normally a lifting device with a lifting platform, via which a pallet with a stack of sheet members may be supplied. A
20 pallet with the stack is placed on the lifting platform of the processing apparatus, for instance by means of a lift truck or fork lift. During destacking and supplying, respectively, the stack is moved on the lifting platform continuously up towards the top of the feeding part, where a suction discs device one by one takes the sheet members and successively feed them into the processing apparatus.

25 In order to minimize the time of idle running of the processing apparatus during shift to a new stack, the operator by means of an extra lifting device comprising a pair of lifting bars may place a new stack under the almost emptied stack. The lifting bars are placed in front of and behind said first lifting device. When the height of the first stack
30 is reduced to about 30 cm, that is when the bottom of the stack is raised about 1.2 m the extra lifting device is started.

The operator inserts manually a number of spears, which may consist of round, flat or profiled iron, through recesses in the wood pallet. These recesses may consist of spaces
35 between the boards uppermost of the pallet. The spears are placed over the lifting bars

of the extra lifting device. The latter is now moved upwards, so that it via the spears supports and carries the last part of the first stack.

The lifting platform of said first lifting device is now moved downwards again, the
5 empty pallet is removed, and a new pallet with stack is inserted. By means of said first lifting device the stack is moved upwards against the underside of the spears, so that the new stack also carries the last part of the previous stack. The extra lifting device is lowered and the spears are then retracted by the operator - one by one - of the total stack, as the original or uppermost part of the stack is little (minor than 30 cm) and
10 therefore has low weight. The shift of stack is now ended.

This known method requires specially manufactured pallet, for instance wood pallets, and a quick and careful operator.

15 The invention has for its purpose to reduce or to eliminate entirely the times for shift and to avoid the special wood pallets, which are expensive and which only can be used for a certain type of apparatus. The purpose is also to reduce the number of working stops and to avoid dangerous working situations arising because of the fact that the shifting mechanism may be difficult to secure or to screen without reducing the
20 freedom of movement of the operator and without increasing the shifting time. It is furthermore the purpose to give the sheet members a gentle treatment, so that the waste is minimized.

The method according to the invention is distinctive in that the pre-adjusted stack of
25 sheet members by the preceding adjustment are placed in a predetermined position on the carrying plate, preferably close to the front edge thereof, that the stack in the feeder part of a first lifting device is moved upwardly for successive feeding of uppermost sheet in the stack to the processing apparatus, that an extra lifting device takes over and moves a last part of the stack up towards the top of the feeding part, as the stack in a
30 per se known manner is supported temporarily on the extra lifting device by means of a number of carrying bars or spears, that a new stack is feeded to said first lifting device in the feeding part and is lifted upwards to engagement under said last part of the previous stack, and that the extra lifting device is moved downwards, before the carrying bars or spears are retracted, so that the last part of the previous stack being
35 placed directly on the new stack of sheet members, etc.

By means of simple provisions it hereby becomes possible to reduce or entirely to eliminate the time shifts and to avoid the special wood pallets, which are expensive, and

which only can be used for a certain type of apparatuses. Furthermore the number of working stops may be reduced, and dangerous working situations, which may arise as a consequence of the fact that the shifting mechanism is difficult to secure or to screen, without reducing the freedom of movement of the operator, are avoided. It is further-
5 more possible to ensure a gentle treatment of the sheet members, so that the waste may be minimized correspondingly.

In order to avoid interruptions of operation of the feeding arrangement of the processing apparatus with the said suction discs, it is possible - in a simple manner during the
10 shift of stacks - to eliminate the occurring difference of height - corresponding to the total thickness of carrying bars or spears - by the fact that the front end first and then the hindmost end of said first lifting device successively are lifted during the retraction of the carrying bars or spears. And appropriately the carrying plates may consist of simple rectangular plates of cheap, homogeneous material, such as oil-hardened
15 masonite, metal or plastic.

Alternatively the carrying plates may be provided with rows of preferably oval holes being adapted to a special lifting device comprising upwards directed lifting fingers adapted to be stuck upwards through said oval holes for lifting free a stack from the
20 carrying plates - during successive destacking and feeding of sheet members from the stack, respectively.

The invention furthermore relates to an apparatus for use of said method and comprising a feeder part with a first lifting device, which apparatus is distinctive in that the
25 first lifting device comprises a conveyor with mutual separated, endless carrier belts or straps being adapted to receive a pre-adjusted stack of sheet members on a carrying plate via a feeding conveyor placed before the feeding part, that a feeding device being placed just before the feeding part and comprising a horizontal carrying frame for an aggregate, which carrying frame being height adjustable between vertical carrying
30 pillar, which aggregate between opposite carrying side pieces of the carrying frame may be moved forwards and backwards between a retracted position over the feeding conveyor and an advanced position over the feeding part, said aggregate comprises a number of carrying bars and spears being adapted to be placed under the carrying plate for the last part of the stack, an extra lifting device being adapted for temporary
35 support of said carrying bars or spears and the last part of the stack until a new stack has been placed under the carrying bars or spears, and holding back means adapted to maintain the position of the remaining stack and the new stack during the retraction of the carrying bars or spears. Hereby a quick and precise shift from one stack to another

is obtained. The quick shift may be obtained, because few light things (the flat, thin carrying plates) may be retracted very precisely without the need of large strength or energy.

- 5 To avoid variations of height of the total new stack during the shift of stacks the apparatus according to the invention advantageously may be such provided, that the belt conveyor is such provided that the front end first and then the hindmost end thereof successively are lifted during the retraction of the carrying bars or spears in order to compensate the otherwise occurring difference in height of the total stack - during the
10 shifting of stacks.

An alternative apparatus for practicing the method according to the invention comprises a feeder part with a primary lifting device and is distinctive in that the primary lifting device comprises a lifting frame with a number of crossbeams being placed between a
15 stationary belt conveyor, and each of which being provided with a number of upwards directed lifting fingers being adapted to be stuck upwards through holes of a carrying plate, so that a stack of sheet members is lifted free from the carrying plate and is directly supported on the lifting fingers, while the stack - during destacking and supplying of sheet members, respectively - successively is lifted upwardly to a second-
20 ry lifting device comprising carrying bars or spears being adapted to be placed under the stack, that is above the carrying plate, and to take over the further lifting movement of the remaining stack.

The alternative apparatus may furthermore be such provided that it in connection with
25 the primary lifting device comprises a device for removal of said carrying plates to a magazine.

The invention is explained in more detail in the following with reference to the drawing, in which:-

30

Fig. 1 shows a side view of an embodiment for an apparatus according to the invention,

Fig. 2 shows a partial view of the apparatus cf. Fig. 1 - as seen from the top.

35

Fig. 3 shows first method step - insertion of a stack into the feeding part of the apparatus,

- Fig. 4 shows next method step, where a shift of stack begins,
- Fig. 5 shows the method step, where a new stack is inserted under the remaining stack,
- 5 Fig. 6 shows the method step, where the flat, thin carrying plate is retracted,
- Fig. 7 shows the method step, where the extra lifting device returns to its starting position and is ready to take over the remaining stack from the first lifting device,
- 10 Fig. 8 shows an alternative embodiment for a carrying plate for use by the method according to the invention,
- 15 Fig. 9 shows an alternative embodiment for an apparatus according to the invention - as seen from the side,
- Fig. 10 shows the apparatus shown in Fig. 9 - as seen from the line X - X, and
- 20 Fig. 11 shows the apparatus shown in Fig. 9 - as seen from the line XI - XI.

In Fig. 1 the apparatus according to the invention and connected transport system are seen from the side. In the following it is described, how a stack 2 of sheet members 1 is handled before a processing apparatus 7.

25 Before a feeding device 3 a conveyor 15 is placed. From this a stack 2 via the feeding device 3 is moved to a feeding part 5, in which the proper destacking takes place, as the individual sheet members from the top of the stack 2 is transferred to a processing apparatus 7. The latter may consist of different apparatuses, for instance an apparatus
30 for punching out box blanks or a printing apparatus.

Before the stack 2 arrives via the conveyor 15 an adjustment of the stack 2 is carried out by means of a special apparatus to secure a entirely precise and straight stack of sheet members 1, and during this operation the stack 2 is placed on a flat, thin carrying
35 plate 13 being adapted to the processing apparatus 7. The carrying plate 13 substitutes the pallet or similar support surface, on which the sheet members are delivered, in order to enable handling with fork lift and the like.

For instance the stack 2 of sheet members 1 may consist of flat, punched out sheet members to be printed in the processing apparatus 7 and possible to be folded or raised to a carton. By the invention the wood pallet are substituted by flat, thin carrying plates 13 so-called "slip-sheets" consisting of a thin (2 - 6 mm) flat carrying plate 13, the external shape and size of which is larger than the sheet members, as the carrying plate is adapted to the actual processing apparatus 7. For instance the carrying plates 13 may be manufactured from oil-hardened masonite, plastic or metal.

The feeding device 3, which in Fig. 2 is seen from the top, is mainly built up as an aggregate 10 suspended in a portal rack with vertical supporting pillars 8, so that the feeding device is movable both in horizontal direction and in vertical direction, as the feeding device in vertical direction is supported by air cylinders - not shown, and in horizontal direction is displaceable arranged on horizontal carrying side members 7' of a carrying frame 17 suspended between the supporting pillars 8.

In order to synchronize the vertical movement of the aggregate 10 the carrying frame in front of the said air cylinders is mutually connected by means of equalizing chains lead around upper turning axles. Or the carrying frame 17 for the aggregate 10 is at opposite sides parallel guided by means of chain wheels engaging with vertical racks being secured on the inner sides of the supporting pillars 8. By controlling the pressure in the air cylinders the aggregate 10 may be raised, lowered or be placed in any equilibrium, that is where the aggregate seems to be almost "weightless".

The aggregate 10 comprises carrying bars or spears 19, a holding back arrangement 20, 22 and a pushing device 21. The spears 19, of which there are 10 pieces, are mounted on a cross slide suspended between two trolleys running on the inner sides of the carrying side members 7'. At the points of the carrying bars or spears 19, these are on the top side provided with upwards directed hooks, which - when the carrying bars or spears 19 are retracted from the stack 2 - may bring along the flat carrying plate 13 to the rear of the stack 2. The cross slide for the carrying bars or spears 19 is driven via toothed belt of the gear motors with more speeds, as the carrying bars or spears 19 are firmly mounted on the cross slide.

Aggregates 10 comprise as mentioned also a holding back arrangement with a lowermost holding back means 22 and an uppermost holding back means 20, mounted on a common cross slide suspended between two trolleys running external on the carrying side members 7'. The uppermost holding means 20 is such adapted that it in addition to the movement forwards and backwards furthermore may rock a front edge

of a crossbeam up and down to avoid to hit the rear edge of the carrying plate 13, when the holding back means 20 is moved forward. The holding back means 20 and 22 are also driven via toothed belts by means of a gear motor with more speeds.

- 5 At each side of the cross slide for the holding back means 20 and 22 a pneumatic braking device is placed adapted to grip around one of the flange of the carrying side member, so that the holding back means 20 and 22 may be locked in any horizontal position.
- 10 The pushing device 21 comprises an air cylinder without piston rod, also called a shuttle cylinder. Its length of stroke is such adapted that it can push a carrying plate 13 entirely to the rear of the aggregate 10 to a magazine or possible to a conveyor leading the carrying plates 13 back to said adjusting apparatus.
- 15 By the first method step (Fig. 3) a stack 2 has just been supplied to a first lifting device in the feeding part 5, while next stack 2 stands ready under the feeding device 3, as both the latter and the lifting device 9 are in initial position. The first lifting device 9, shown in Fig. 2, is provided with a belt conveyor.
- 20 The feeding part 5 is in its lower initial position; and the beams 11 of an extra lifting device are both lowered. First lifting device 9 has just received or is ready to receive a stack 2 from the feeding device 3, where the aggregate 10 is lowered just over the beams 11 of the extra lifting device. The carrying bars or spears 19 and the holding back means 20 and 22 (Fig. 2) are in their retracted position. The pushing device 21
25 (Fig. 2) is in its initial position.

By change to next method step (Fig. 4) the following takes place. The first lifting device 9 is moved upwards in step with destacking of sheet members 1 by a suction disc device 24, which continues until the first lifting device 9 has reached the height of the
30 beams 11 of the extra lifting device, that is when the flat, thin carrying plate 13 is placed just over the beams of the extra lifting device 11.

Now the carrying bars or spears 19 of the feeding device 3 is moved forward between the belts of the belt conveyor on the first lifting device 9, so that the spears 19 are
35 placed over the beams 11 of the extra lifting device 11, which now is moved upwards. The first lifting device 9 is lowered to its initial position, so that the remaining stack 2 now is supported on carrying bars or spears 19 and the extra lifting device 11, which

both are moved upwards together, as the aggregate 10 of the feeding device now is in any equilibrium or - cf. the above-mentioned - is almost "weightless".

Next method step is explained with reference to Fig. 5, where first lifting device 9 of the feeding part 5 has received a new stack 2 and is moved upwards below the carrying bars or spears 19 and takes over the weight from the remaining part of the previous stack 2, so that the extra lifting device 11 is relieved.

The holding back means 20 and 22 of aggregate 10 is now moved forward, where the upmost rockable holding back means 20 first is lifted up over the rear edge of the carrying plate and lowered down onto said carrying plate, when the crossbeam is over the carrying plate 13. When the holding back means 20 and 22 rest against the back of the remaining stack 2 and the new stack 2, respectively, the holding back slide is locked to the carrying side members by means of said braking device.

15

The extra lifting device 11 of the feeding part 5 may now be lowered to its initial position (Fig. 6), and the carrying bars or spears 19 of the feeding device 5 may be retracted of the entire stack 2, as first the front edge of the belt conveyor 9 and successively the rear edge of the belt conveyor 9 is raised - during the retraction of the carrying spears 19 to the rear of the stack 2 - to compensate for the otherwise occurring difference in height between the front end and the rear end of the stack 2, which might cause irregularities for the suction disc device of the processing apparatus on the top of the stack. When the spears 19 are outside the stack 2 also the holding back means 20 and 22 are retracted to its initial position, Hereafter a new stack 2 may be moved in position on the feeding device 3.

Last method step for the carrying out a shift of stacks is explained with reference to Fig. 7. When the carrying bars or spears 19 and the holding back means 20 and 22 are placed in the initial position, the aggregate 10 is raised up on level with the carrying plate magazine or the carrying plate conveyor and the pushing device 21 (see Fig. 2) pushes the carrying plate 13 from the spears 19 further to the rear. Hereafter the pushing device 21 returns to its initial position, and the aggregate 10 is lowered to the same level as that of the extra lifting device 11, and the feeding device 3 is now ready to carry out a new shifting operation.

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The method may within the scope of the invention be modified without differing from the idea of the invention, as the invention may be used within other technical fields than the cartilage industry, as high feeding speed within mechanical processing,

handling of fragile items or manufacturing of information carriers is just as essential. And the flat, thin carrying plate does not need to be completely flat, as it due to friction reduced reasons either may have small projections, or there may be other holes or discontinuities.

5

The alternative carrying plate 25 shown in Fig. 8, which for instance consists of masonite, is provided with a large number of ovale holes 26, and which is adjusted to an alternative apparatus cf. Fig. 9 - 11 with a special primary lifting device 27 with a lifting frame 28 with a number of crossbeams 29 being placed between a stationary belt conveyor 30, and each of which crossbeams 29 being provided with a number of upwards directed lifting fingers 31 being adapted to be stuck upwards through the holes 26 of a carrying plate 25, so that a stack of sheet members is lifted free from the carrying plate 25 and is directly supported on the lifting fingers 31, that is that the carrying plate 25 is loosely placed between the lifting fingers 31 on top of the crossbeams 29. Hereafter the stack - during destacking and feeding of sheet members, respectively - successively is lifted upwardly to the secondary lifting device 11, where the carrying bars or spears 19, which now may be inserted over the carrying plate 25, take over the further lifting movement of the remaining stack; while the primary lifting device 27 returns to its lowermost position between the individual belts of the belt conveyor 30, whereafter the empty carrying 25 may be taken out to a magazine, before a new stack is feeded in on the belt conveyor 30 respectively over the primary lifting device 27, etc.

By the alternative embodiment of the apparatus according to the invention the carrying bars or spears 19 and various holding back means may be provided more simply, as it and it causes a considerable simplification, that the carrying plates 25 may be retracted below in stead of above in connection with retraction of the carrying bars or spears 19.

30

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CLAIMS

1. A method for destacking and supplying sheet members (1) from a stack to a processing apparatus, and where the sheet members (1) are supplied via a feeder part (5) in pre-adjusted stacks on carrying plates (13), *characterized* in that the pre-adjusted stacks (2) of sheet members (1) by the preceding adjustment are placed in a
5 predetermined position on the carrying plate (13), preferably close to the front edge thereof, that the stack (2) in the feeder part (5) of a first lifting device (9) is moved upwardly for successive feeding of uppermost sheet in the stack (2) to the processing apparatus (7), that an extra lifting device (11) takes over and moves a last part of the stack (2) up towards the top of the feeding part, as the stack (2) in a per se known
10 manner is supported temporarily on the extra lifting device (11) by means of a number of carrying bars or spears (19), that a new stack (2) is feeded to said first lifting device (9) in the feeding part (5) and is lifted upwards to engagement under said last part of the previous stack (2), and that the extra lifting device (11) is moved downwards, before the carrying bars or spears (19) are retracted, so that the last part of the previous
15 stack (2) being placed directly on the new stack (2) of sheet members (1), etc.
2. A method according to claim 1, *characterized* in, that the front end first and then the hindmost end of said first lifting device (9) successively are lifted during the retraction of the carrying bars or spears (19) in order to compensate the otherwise
20 occuring difference in height of the total stack (2) - during the shifting of stacks.
3. A method according to claims 1 and 2, *characterized* in that the carrying plates (13) are simple rectangular plates of a homogeneous material such as oil-hardened masonite, metal or plastic.
25
4. A method according to claims 1 - 3, *characterized* in that the carrying plates (25) are provided with rows of preferably oval holes (26).
5. An apparatus for use of the method according to claim 1, and comprising a feeding
30 part (5) with a first lifting device (9), *characterized* in that the first lifting device (9) comprises a conveyor (12) with mutually separated, endless carrier belts or straps being adapted to receive a pre-adjusted stack (2) of sheet members (1) on a carrying plate (13) via a feeding conveyor (15) placed before the feeding part (5), that a feeding device (3) being placed just before the feeding part (5) and comprising a
35 horizontal carrying frame for an aggregate (10), which carrying frame being height ad-

justable between vertical supporting pillars, which aggregate (10) between opposite carrying side members of the carrying frame may be moved forwards and backwards between a retracted position over the feeding conveyor (15) and an advanced position over the feeding part (5), said aggregate (10) comprises a number of carrying bars and
5 spears (19) being adapted to be placed under the carrying plate (13) for the last part of the stack (2), an extra lifting device (11) being adapted for temporary support of said carrying bars or spears (19) and the last part of the stack (2) until a new stack (2) has been placed under the carrying bars or spears (19), and holding back means (20, 22) adapted to maintain the position of the remaining stack (2) and the new stack (2) during
10 the retraction of the carrying bars or spears (19).

6. An apparatus according to claim 5, *characterized* in that the conveyor (12) is such provided that the front end first and then the hindmost end thereof successively are lifted during the retraction of the carrying bars or spears (19) in order to compensa-
15 te the otherwise occurring difference in height of the total stack (2) - during the shifting of stacks.

7. An apparatus for use of the method according to claim 1 and comprising a feeding part with a primary lifting device (27), *characterized* in that the primary lifting
20 device (27) comprises a lifting frame (28) with a number of crossbeams (29) being placed between a stationary belt conveyor (30), and each of which being provided with a number of upwards directed lifting fingers (31) being adapted to be stuck upwards through holes (26) of a carrying plate (25), so that a stack of sheet members is lifted free from the carrying plate (25) and is directly supported on the lifting fingers (31),
25 while the stack - during destacking and supplying of sheet members, respectively - successively is lifted upwardly to a secondary lifting device (11) comprising carrying bars or spears (19) being adapted to be placed under the stack, that is above the carrying plate (25), and to take over the further lifting movement of the remaining stack.

30 8. An apparatus according to claim 7, *characterized* in that it - in connection with the primary lifting device (27) - comprises a device for removal of said carrying plates (25) to a magazine.

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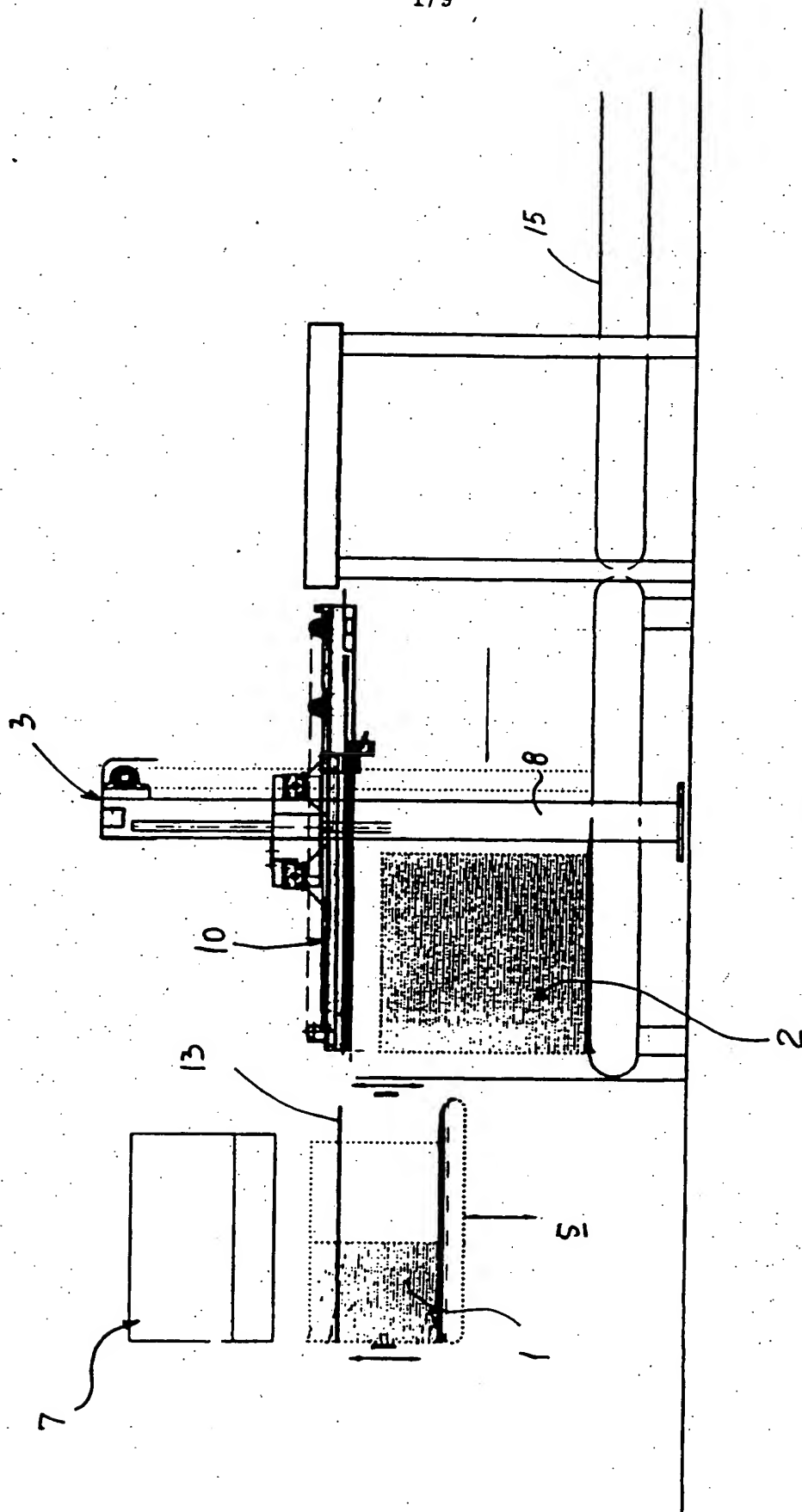


Fig. 1

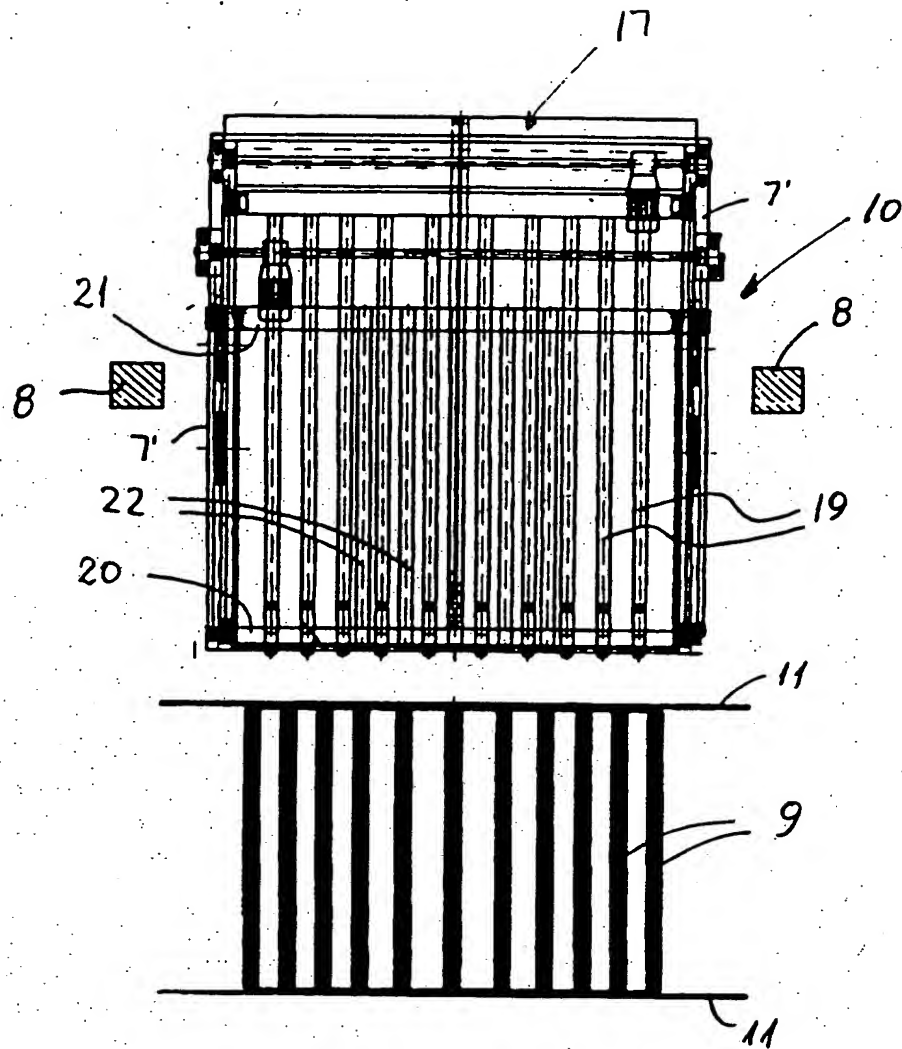


Fig. 2

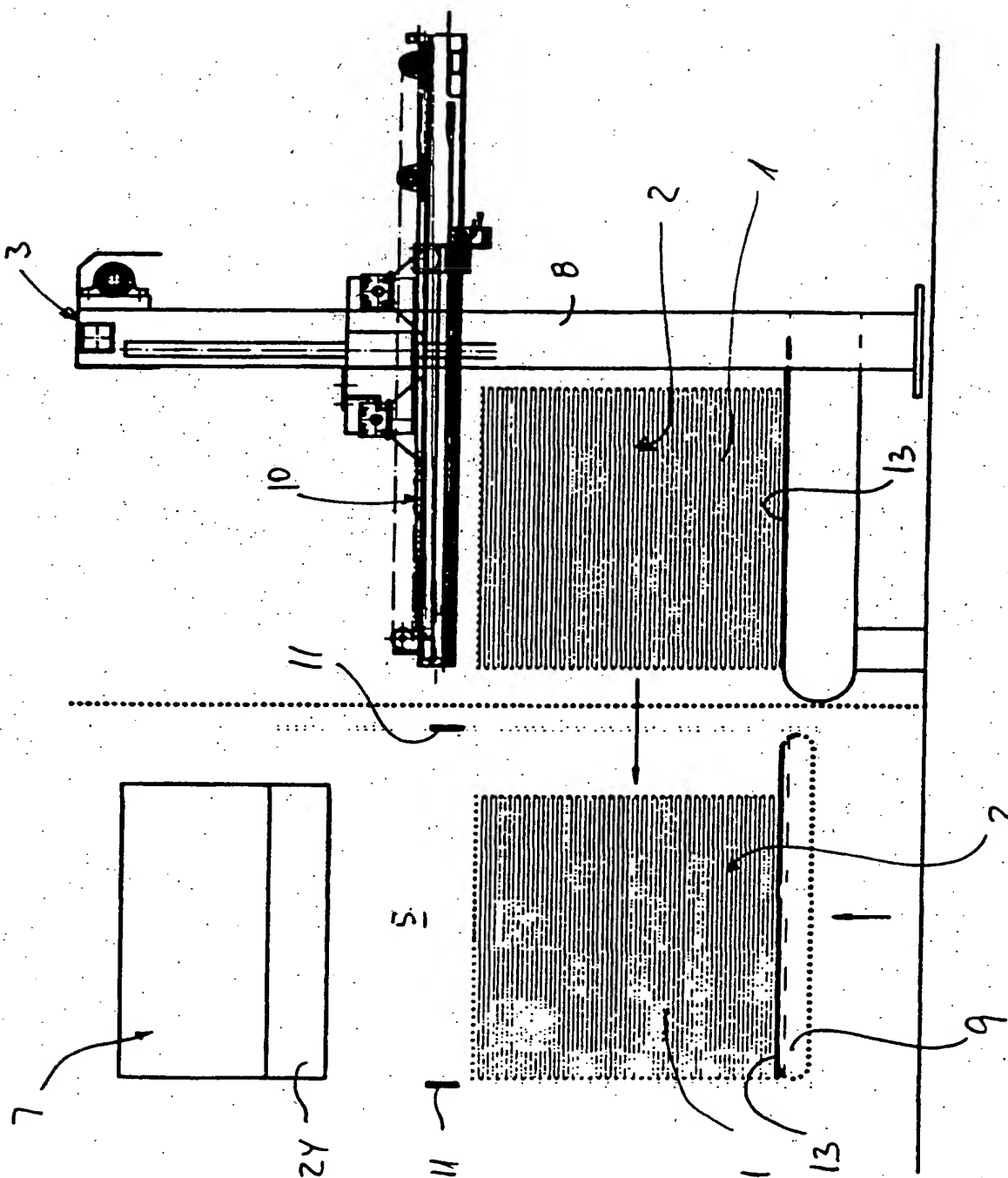


Fig. 3

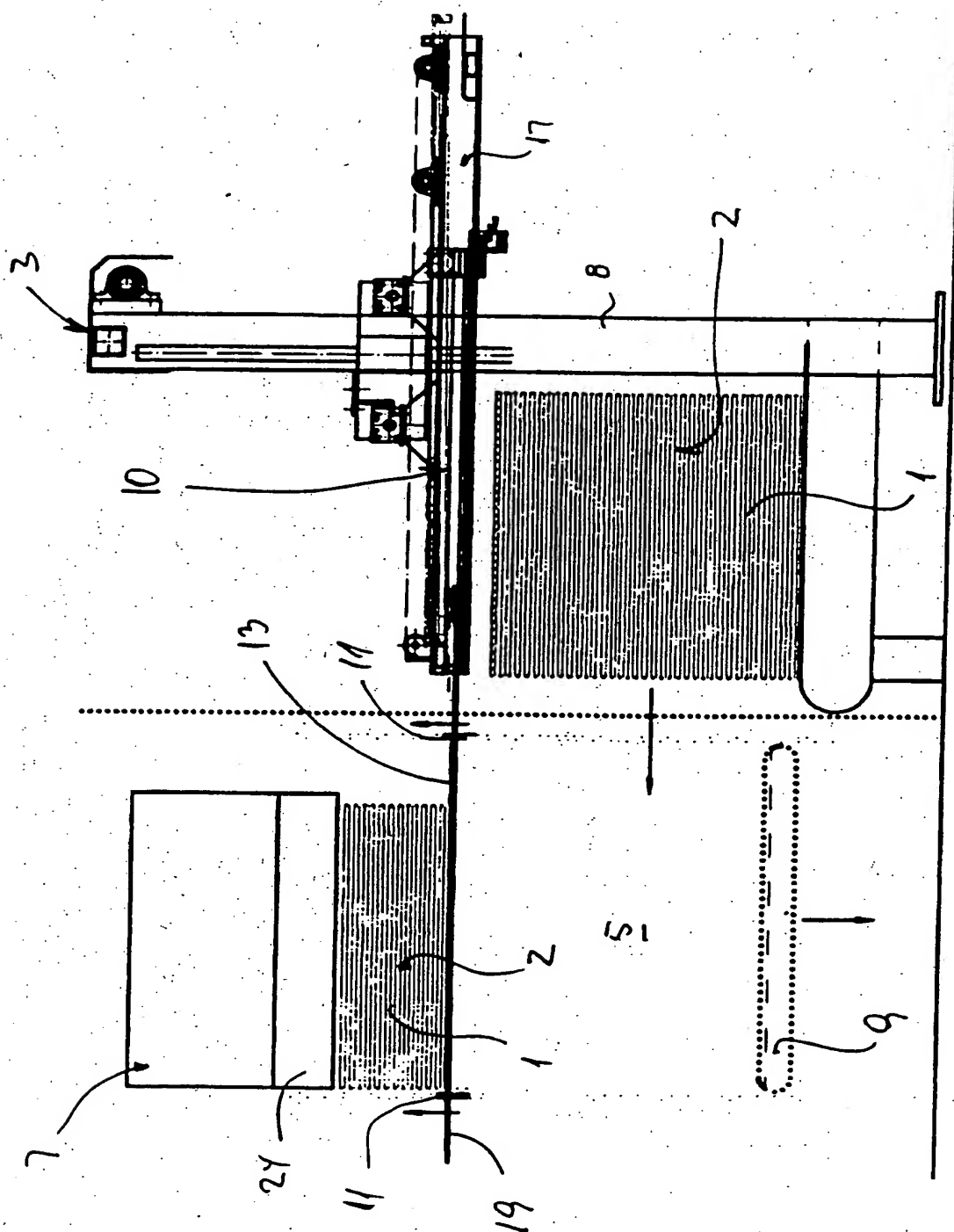


Fig. 4

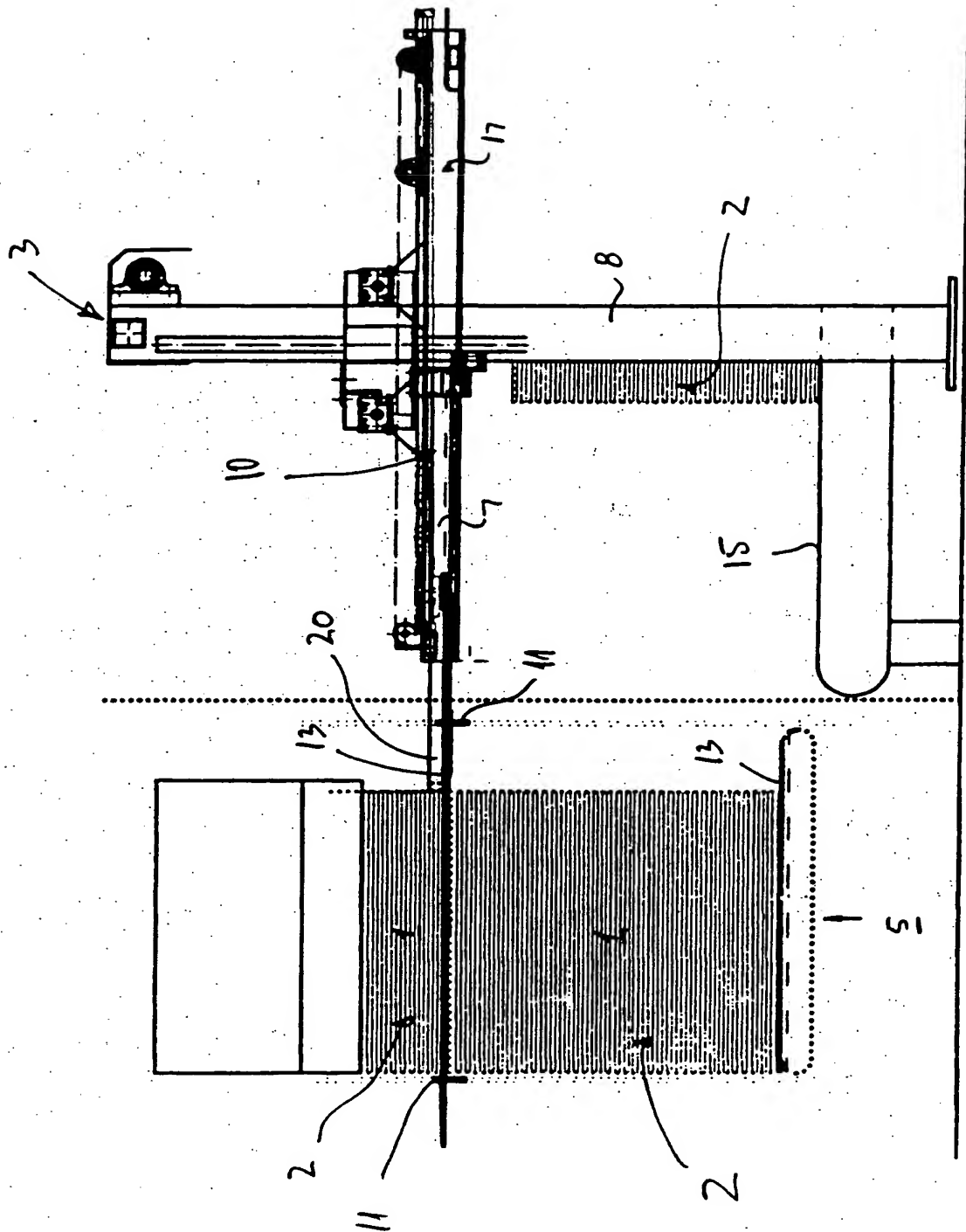


Fig. 5

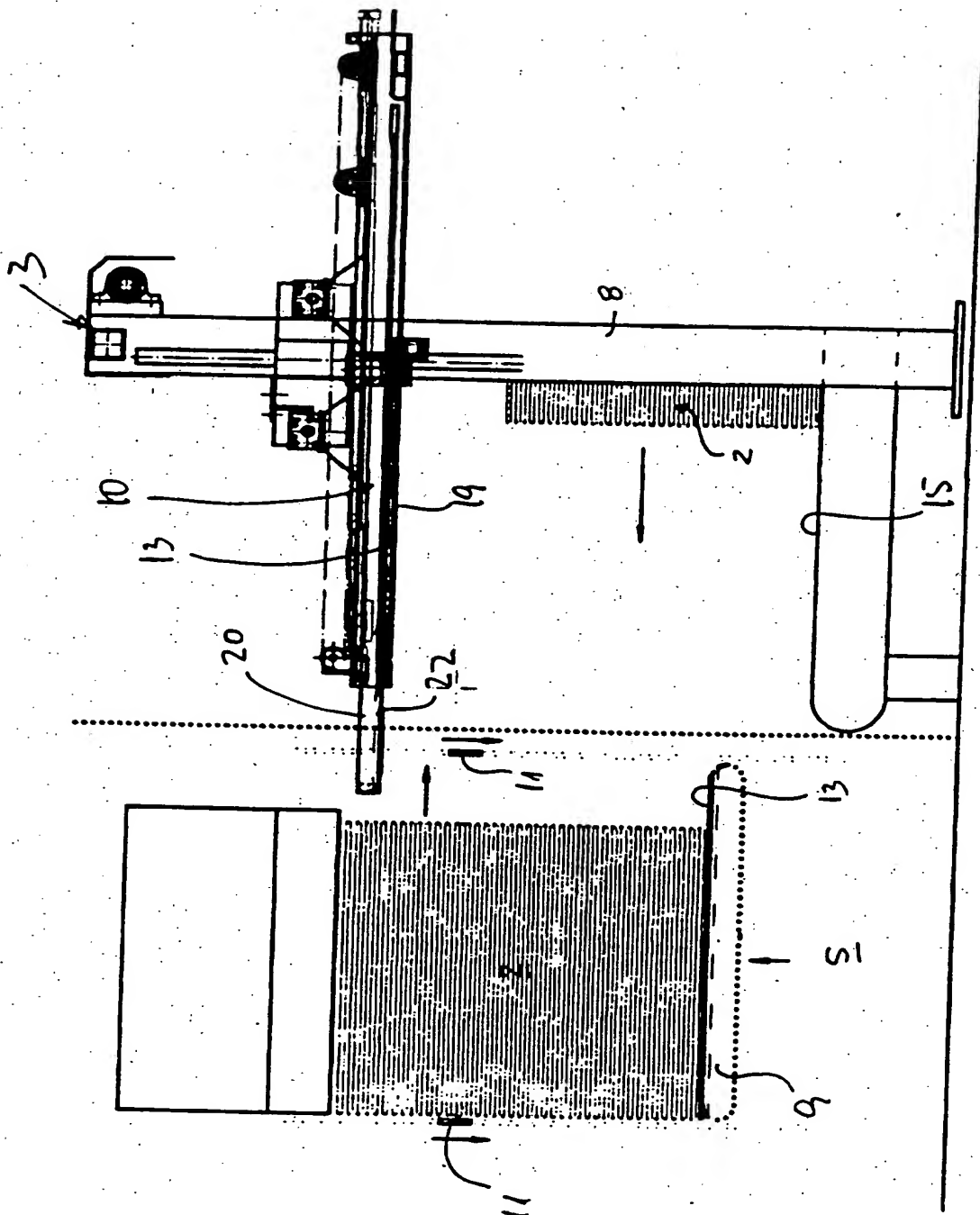


Fig. 6

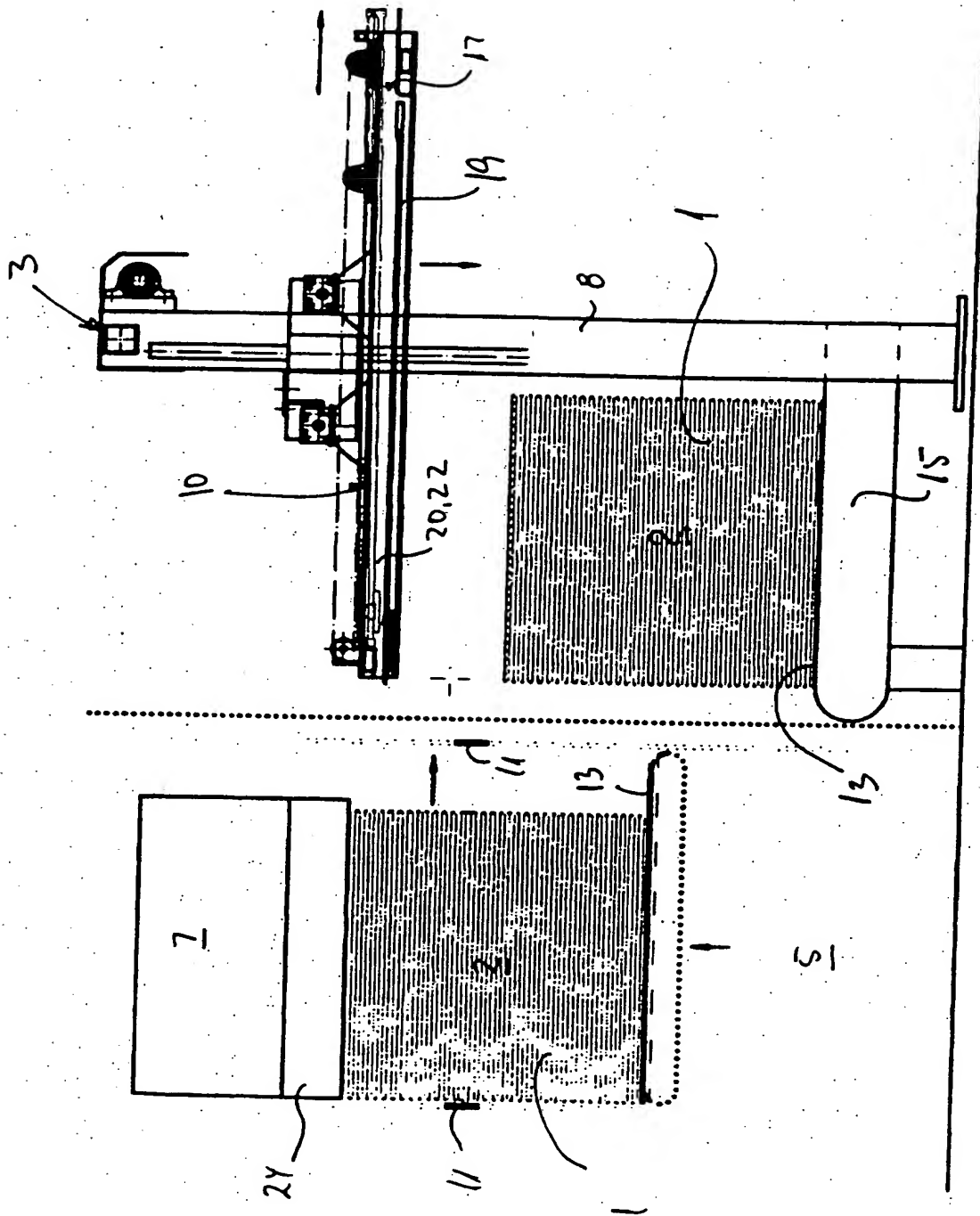


Fig. 7

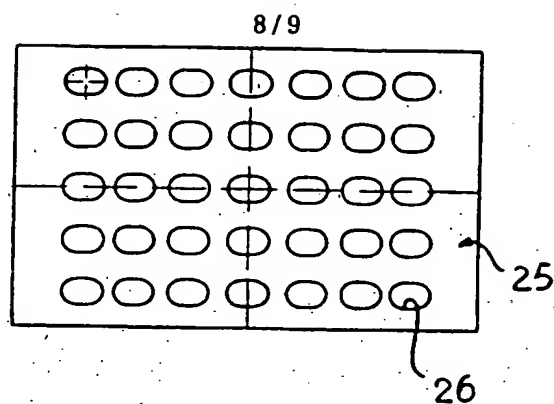


Fig. 8

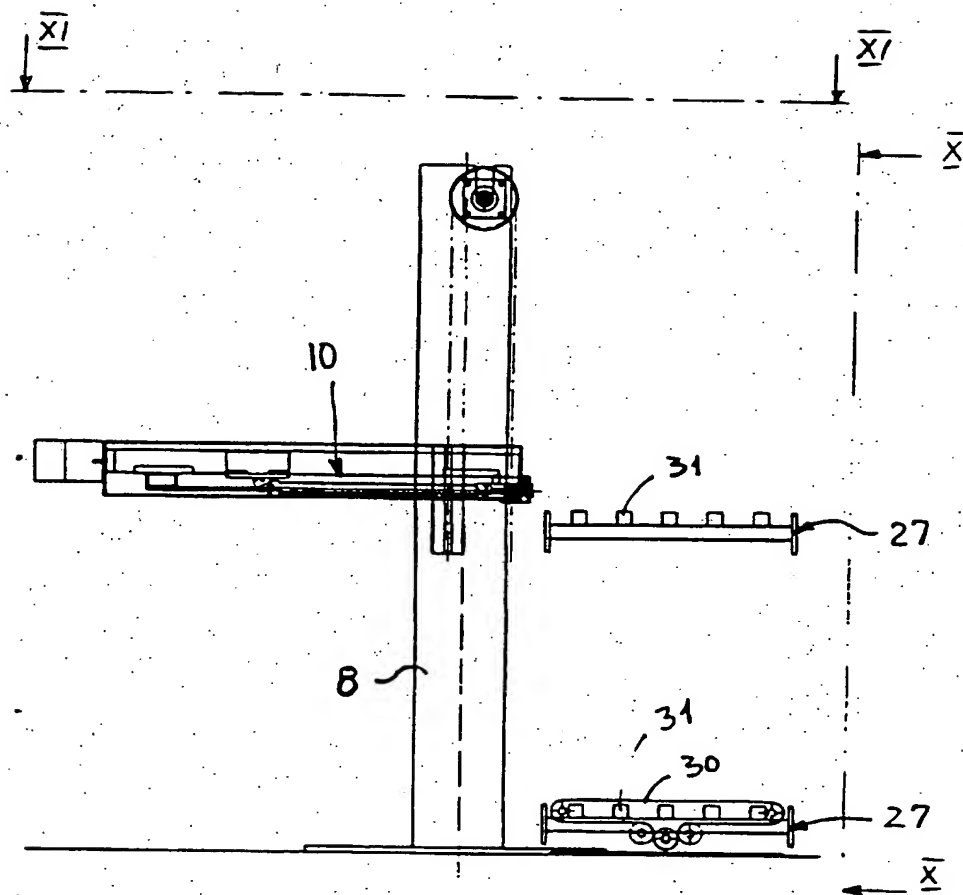


Fig. 9

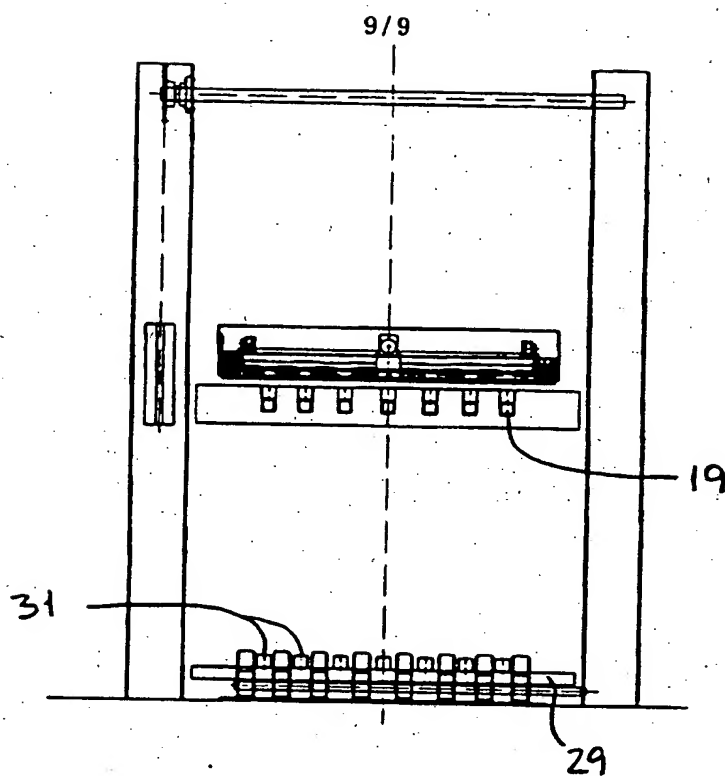


Fig. 10

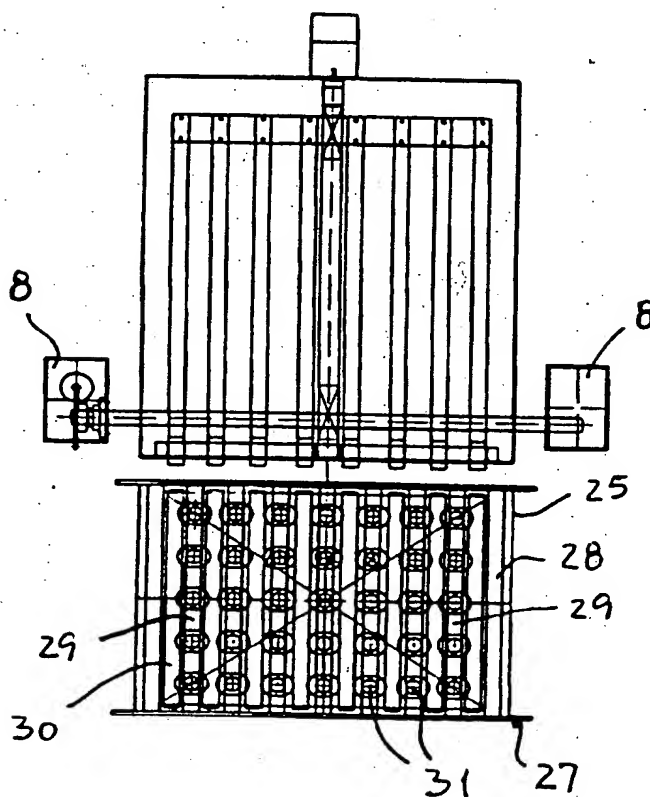


Fig. 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 96/00170

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65H 1/26, B65H 31/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3180638 A (G. MEYLAN), 27 April 1965 (27.04.65), column 2 - column 5, figures 1-10	1-4
Y	--	5-6
Y	US 5303911 A (E.M. ZAHN ET AL), 19 April 1994 (19.04.94), column 4 - column 8, figures 1-19	5-6
Y	US 4949953 A (E. CLAESSEN ET AL), 21 August 1990 (21.08.90), column 2, line 51 - line 56, figure 1, detail 2	5-6

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

27 June 1996

Date of mailing of the international search report

18 -07- 1996

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INTERNATIONAL SEARCH REPORT

Information on patent family members

01/04/96

International application No.

PCT/DK 96/00170

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3180638	27/04/65	NONE	
US-A- 5303911	19/04/94	CN-B- 1026088	05/10/94
		CN-A- 1070158	24/03/93
		DE-C- 4129139	14/01/93
		FR-A,B- 2680770	05/03/93
		GB-A,B- 2259086	03/03/93
		JP-A- 5238566	17/09/93
		JP-B- 7049337	31/05/95
US-A- 4949953	21/08/90	DE-A,A,C 3739194	01/06/89
		DE-A- 3882652	02/09/93
		EP-A,A,A 0316568	24/05/89
		ES-T- 2051813	01/07/94
		FI-B,C- 91385	15/03/94
		JP-A- 1162678	27/06/89

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